well distributed. In Western Australia I have never found more than four eggs laid by our Sparrow-hawk *(Accipiter cirrocephalus)*.

With the Kestrels I find this difference. In England five eggs are the rule, with the red falcon-like markings distributed thickly all over the shell, but in Western Australia our Nankeen Kestrel usually lays four, and I find the ground colour as a rule easily visible, the markings often being in blotches or in innumerable small spots.

OBSERVATIONS ON THE MOUNTAIN DEVIL

(Moloch horridus)

By S. R. WHITE, Government School, Coorow.

Shortly after my arrival at Coorow, early in February 1947, I became attracted by the abundance of the *Moloch* throughout most of the sandplain areas, and particularly on a sandplain adjacent to the town. In order to observe specimens at close quarters I constructed a number of small four-walled portable enclosures. These were without either top or bottom, and could be placed over suitably situated ant trails. Numerous *Molochs* were held captive in these boxes for periods up to three months, and were then liberated.

Most specimens on capture were infested with small ticks, which were usually found attached to softer parts of the body, beneath the joints of the limbs and about the eyes. Some newly captured individuals struggled vigorously to escape while being handled, but others assumed a "freeze." In this attitude, the head and tail collapse into a horizontal position so that the throat, belly and under tail rest upon the ground, and the eyes are shut. Occasionally individuals found in the free state adopted this stance, apparently as a protective reaction, but others scuttled for cover.

Unfortunately many of the illustrations depicting this little reptile show it in the collapsed posture, thus creating in the minds of those who do not know it in the field quite a wrong impression of its "personality". This impression may also be supported by the fact that so many of the specimens seen "on exhibition" are displayed under conditions quite artificial to the creature's natural environment. It reacts accordingly. To my experience the *Moloch's* agility reflects completely the temper of the sunshine. At the hottest time of day, I often found one advancing across a bare sandpatch; the peculiar rocking hesitant motion punctuated with short scrambling runs. The head and tail are both raised to form with the body an almost perfect arc, and the movement is almost mechanical. The general impression is both grotesque and comical.

Captive *Molochs* were only seen to eat the one type of ant, . . . a small black species very common in these parts. They were taken by a rapid flicking action of the tongue. One individual was observed to consume 120 ants during a five minute period, but as the ant trail upon which it was feeding was not a particularly good one, I believe that this is below the normal rate of feeding.

Mountain Devil (Moloch horridus). Upper view: Adult in characteristic walking attitude. Lower view: Eggs freshly removed from burrow.

A fairly wide range of colours were noted. The lighter portions varied from cream to a fairly bright yellow, and the darker portions in some individuals were almost black. Interesting colour changes were noted from time to time. Under the influence of strong direct sunlight the colour patterns usually became most vivid and under shady conditions they dulled considerably. However this was not always the case, but generally, most active individuals were highly coloured while those adopting the "freeze" were dull.

Early in February I was shown a nesting excavation at which the adult had been seen at work the previous December. It contained two dead young and the remains of eggs. I was unable to obtain further breeding data until after the winter of 1947.

At 12.30 p.m. on October 28th, one of the school boys, Master Irwin Downes, noticed an eliptical burrow about 3 inches across and three quarters of an inch high, in low lying sandplain. He widened the entrance of the burrow slightly to admit his hand and discovered a *Moloch* about a foot inside. At 4.45 p.m. the reptile was covering the hole in, at ground level. It scraped the sand back with its fore-feet like a cat, walked rapidly away for about a yard, and "froze".

At 7.15 a.m. on the following morning it was scratching debris over the site, and after that time, was seen no more. At 4.15 p.m. I opened the burrow, tracing the course of the tunnel quite easily by its loose filling. The drive sloped downward along seventeen inches, to a depth of ten inches, then opening into a nest chamber seven inches in diameter and four inches high. The tunnel had been sealed, but the nesting chamber was open, the seven eggs which it contained lying half buried on the loose sand floor. Here, the sand was quite damp and warm. I removed the eggs together with a quantity of sand, for the purpose of attempting to hatch them under artificial conditions. They were placed on the sand, in a flower pot saucer, with another flowerpot saucer inverted to act as a covering. Unfortunately the sand dried out too quickly, and five of the eggs collapsed during the first week. By pouring quantities of water into the saucer I endeavoured to keep the sand moist but the two remaining eggs collapsed during the third week.

A sandpit was prepared outside early in November, and one of the enclosures placed over it. A captured *Moloch* laid seven eggs on November 3, another laid ten eggs on November 5, and a third, ten eggs on December 16. No attempt was made to excavate a burrow, probably because the sand was too soft, and all of the eggs had collapsed through exposure by the time they were discovered.

A. S. Le Souef, in the *Proceedings of the Royal Zoological Society of New South Wales,* August 1937, p. 29, suggests that the peculiar spikey thorns which cover the body, and are specially developed on the head and upper surface, are evidently an automatic protection against the attacks of snakes. It may be of some

interest to mention that when handled, the reptiles showed a considerable dislike of being touched either before or behind the junction of the back legs with the body. Their response to such handling was quickly to move the legs either forward or backward in such a way as to cover this apparently vulnerable area, and in doing so the body spines and the leg spines acted more or less as pioneers. If this process were repeated a number of times both fore and aft of the legs, most individuals would abandon the "freeze" and endeavour to make off.

Further observations by Ella McFadyen, referred to in the same paper, suggest that the *Moloch* sleeps with the head raised, but all captive individuals observed by torchlight at night at Coorow were in the collapsed stance.

Le Souef, from observations made on captive specimens liberated at Taronga Park, notes six eggs, and E. R. Waite in *The Reptiles and Amphibians of South Australia,* states that as many as eight have been laid in a clutch in captivity. The apparently large number of ten eggs recorded in the Coorow *Molochs* may bear some relationship to the extraordinary bountiful supply of food to be found there. It was not uncommon to find ant trails up to an inch in width.

Mr. L. Glauert of the Western Australian Museum informs me that correspondents have written to him describing the method of egg-laying, adding that the young hatched out in approximately eight weeks.

BIOCLIMATIC CONTROLS IN WESTERN AUSTRALIA

By Dr. J. GENTILLI, University of Western Australia, Nedlands.

It is well known that climate affects plant and animal life to a very great extent, and yet the student of nature finds it hard to make use of many climatic maps which are available, because they are not suited to his needs. Annual averages, for instance, mean but little to living organisms, and yet most of the maps available show annual averages of temperature or rainfall. The year is too long a period to be taken as a whole, without subdivisions; many plants and many animals go through their whole life-cycle within less than a year. In perennial plants, the vegetative cycle takes place within the year; in animals there are cycles which take place within the year, as nesting and mating seasons well show.

If climatic information is to be used for the study of life, it is therefore necessary to work on periods shorter than a year. Much work has already been done in North America and northern Europe, with regard to the effect of temperature on plant growth; in many countries research has been made into the effect of seasonal rains on wheat, maize and other crops. These studies show that every species has its own requirements, so that it would be impossible to map out climatic information suitable for every branch of natural science. All that may be attempted is the compilation of type-maps, which may serve as a guide and lead the